SVRGIS

Instructions for creating a GIS severe weather report database using ArcGIS

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Overview

- Below are instructions for creating and developing a geographic information systems (GIS) severe weather report database using ArcGIS's ArcMap software. Included in this manual are specific instructions for importing the SVRGIS data into the ArcMap program, as well as different methods to query, sort, or select the data based on user needs. These step-by-step instructions are intended for someone with little or no experience with ArcGIS.

Requirements

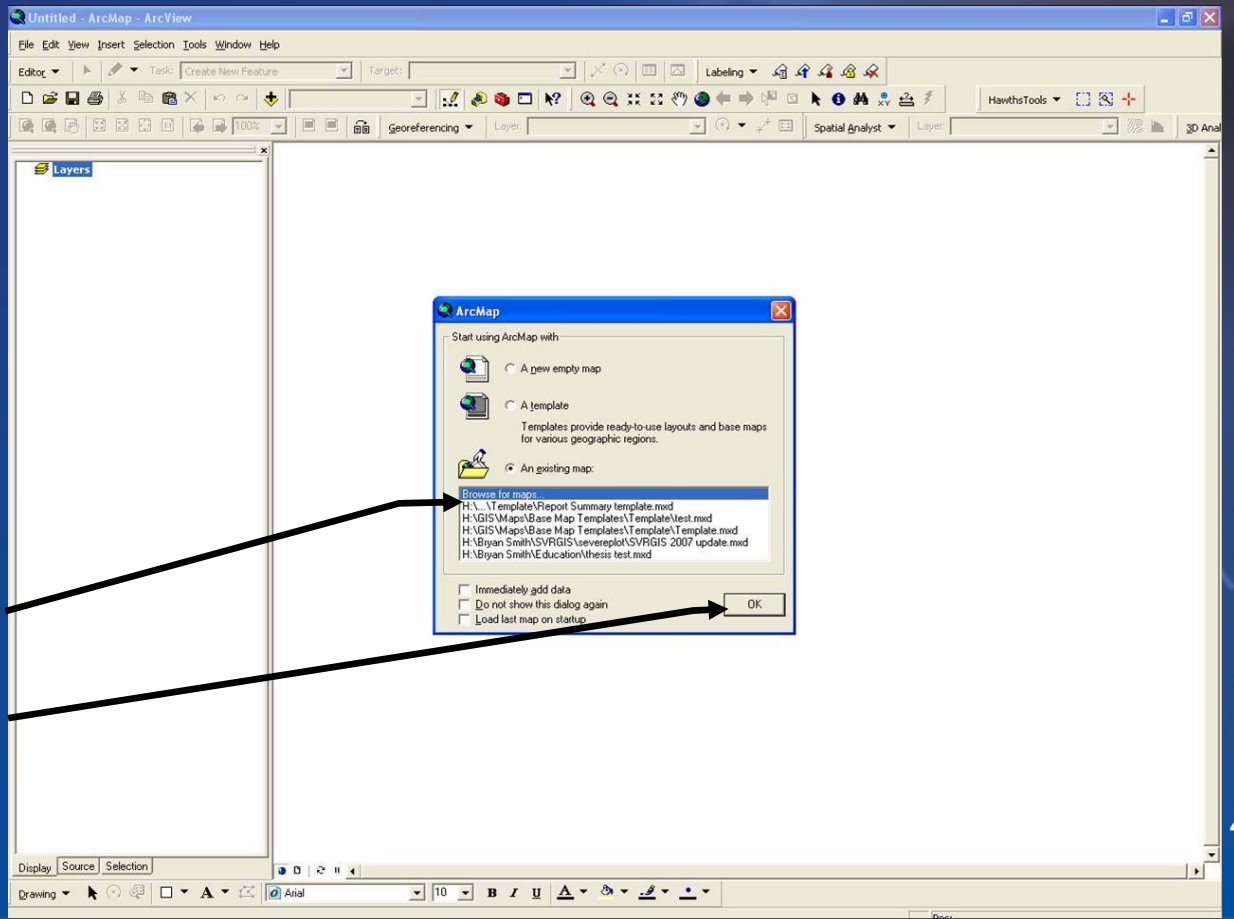
- ArcGIS 9.2 ArcMap software viewing program.

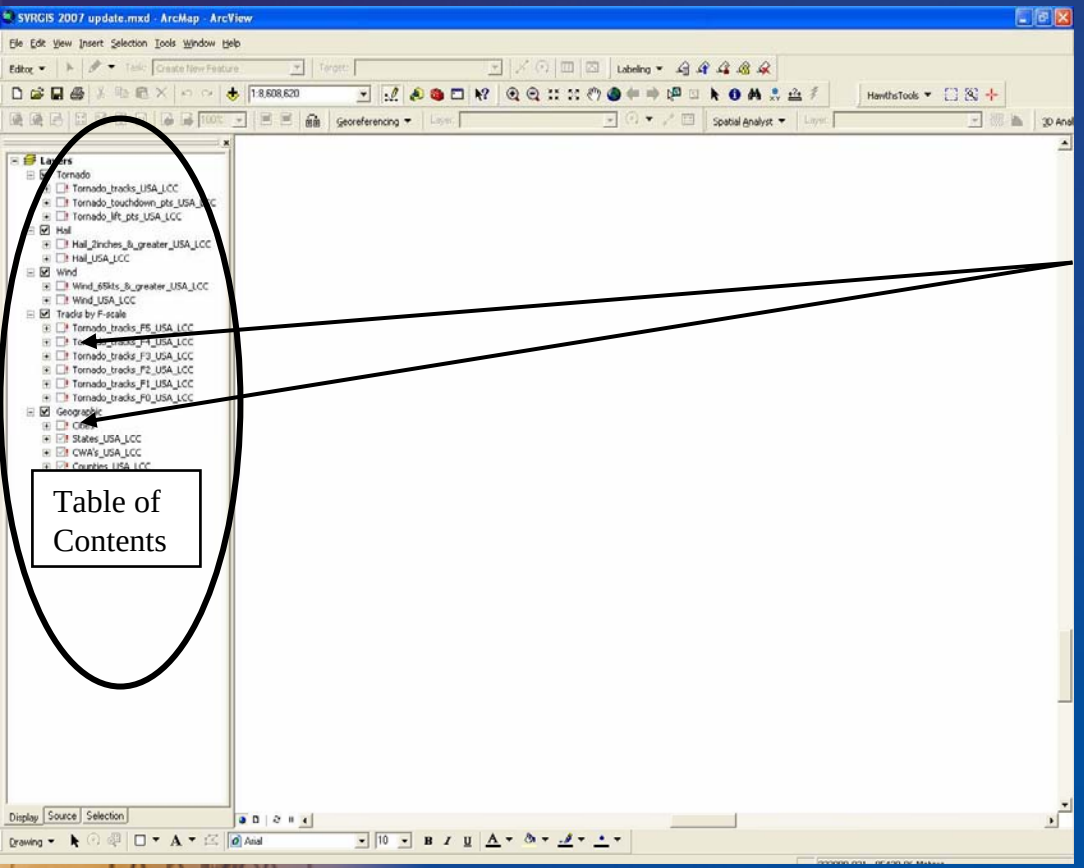
Download files

- All base files are linked and available for download at http://www.crh.noaa.gov/ind/?n=svrgis.
- Download each zipped file and unzip it to a directory location of your choice (e.g., C:\Program Files\SVRGIS).
- Please note that the Cities.zip, topo-grey.zip, topo-brown.zip, and the topo-color.zip files are large (~25-50mb) and these will take time to download.
- When downloading has finished, please unzip each file to a directory location.

Opening files in ArcMap

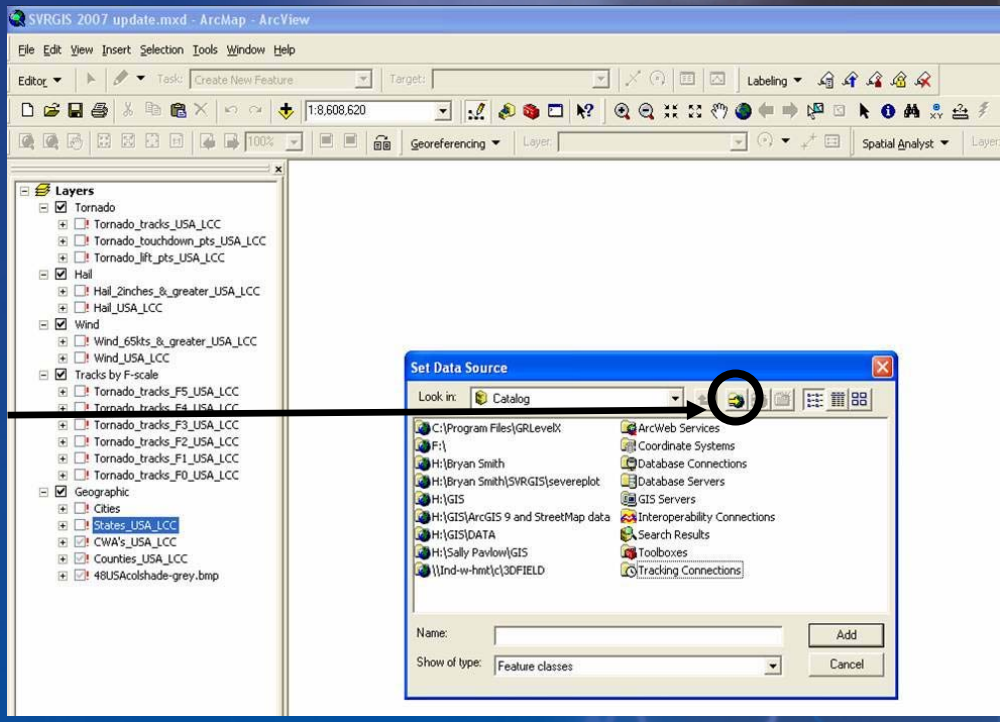
- Open ArcMap by clicking on Start→All Programs→ArcGIS→ArcMap.
- Click on “An existing map” and then click “Browse for maps…” Click “OK.”

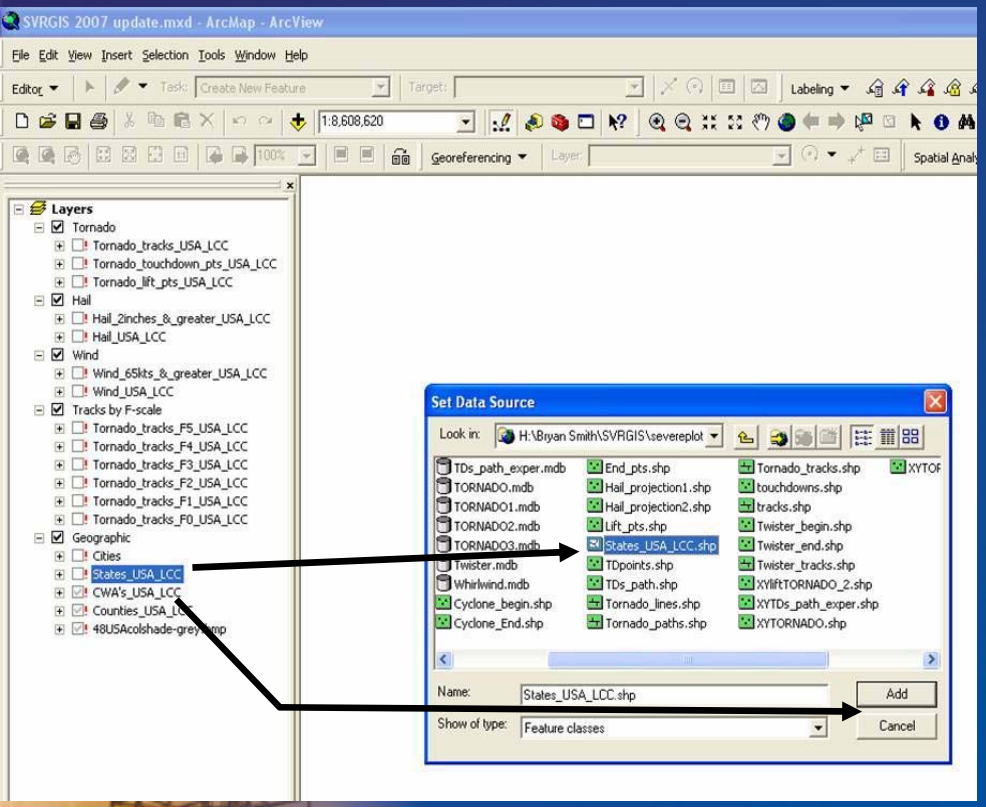




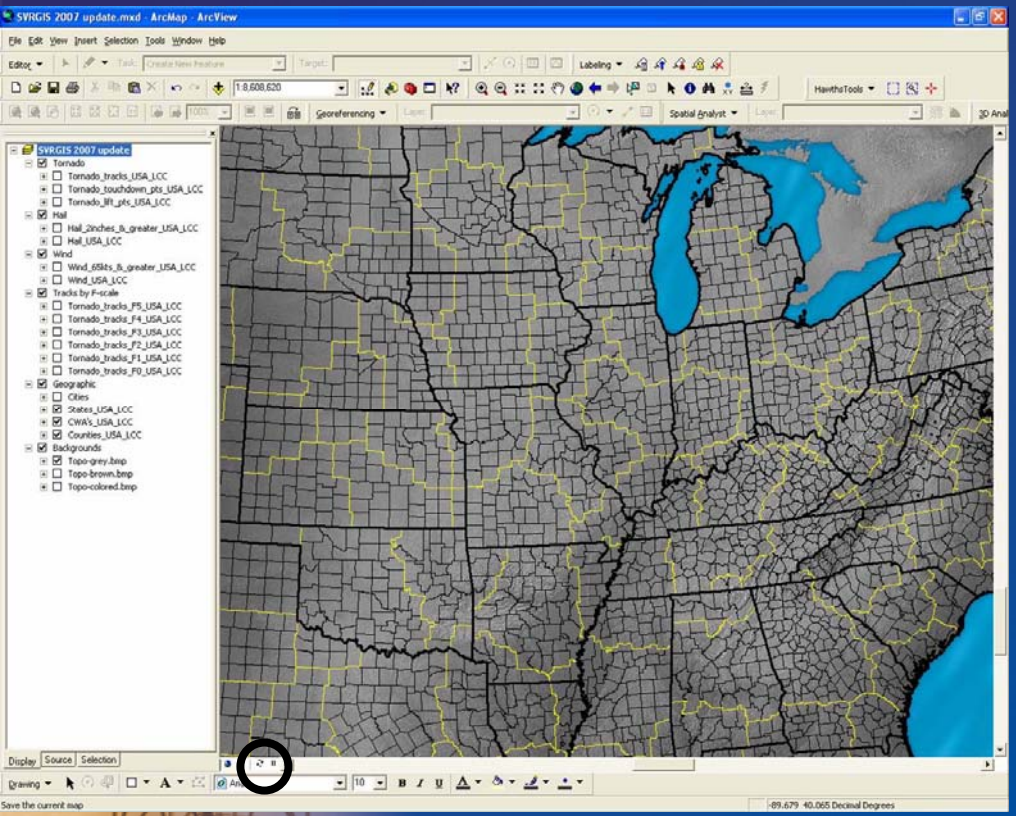
- Navigate to the directory where you copied the files and then open the 'SVRGIS 2007 update.mxd' file. ArcMap will come up with red exclamation points next to each layer in the Table of Contents.

- Click twice (slowly, don't double click) on the check box next to States_USA_LCC.
- When the Set Data Source window pops up, click the 'Connect to Folder' button, browse to the folder where you saved the data, click on it, and click 'OK'.





- Now that the folder is connected, find ‘States_USA_LCC’, single click on it and click ‘Add’.
- This instructs ArcMap to “find” this layer. This should also remove the red exclamation points for the remaining layers if you are using ArcMap version 9.2.
- By completing this action, the layers are referenced to their directory location, thereby displaying data.
  - *If using earlier versions of ArcMap (e.g., 9.1, 9.0, etc…), complete this procedure for every non-referenced layer.*

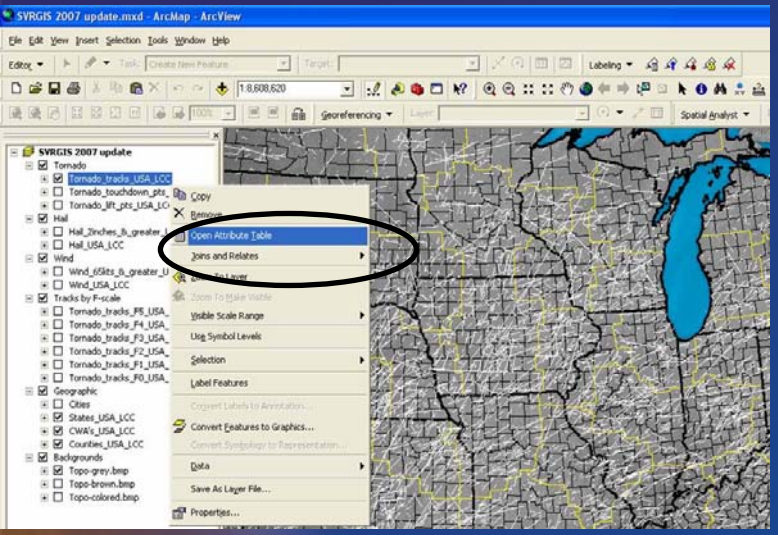


- If ArcMap asks if you would like to build pyramids…answer "yes" as it will take a minute or two to build but it will make navigation faster later.
- When the file has opened, it should look like this:
- If a blank screen shows up, use the 'Refresh' button to redraw the page.
- Uncheck every layer except the following layers:
  - Tornado
  - Hail
  - Wind
  - Tracks by F-scale
  - Geographic
  - States_USA_LCC
  - CWA_USA_LCC
  - Counties_USA_LCC
  - Backgrounds
  - Topo-grey.bmp

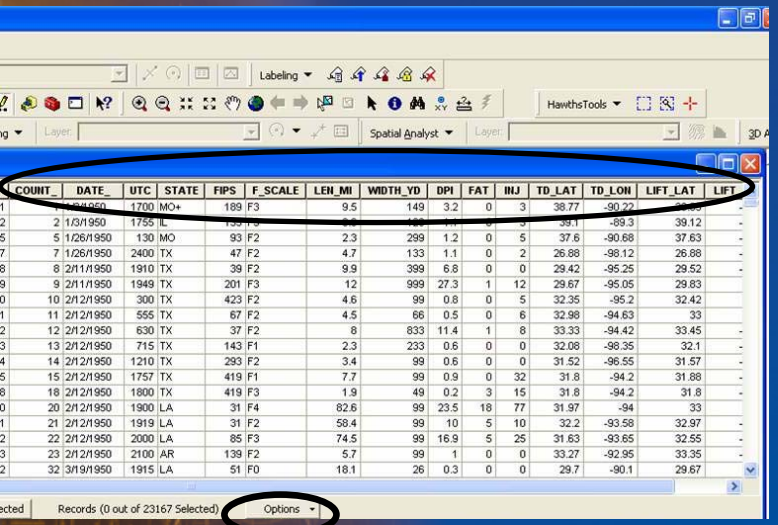
Querying Data

- Overview
  - There will be 3 data query examples presented; the 1st and 2nd examples are based on attribute queries of violent tornadoes and Indiana respectively.
  - The 3rd example is a spatial query (violent tornadoes ←→ Indiana).
  - Querying data involves data selection based on a property attribute (e.g., city name, F-scale rating, period of several years) or spatial attribute (e.g., state, county, county warning area)

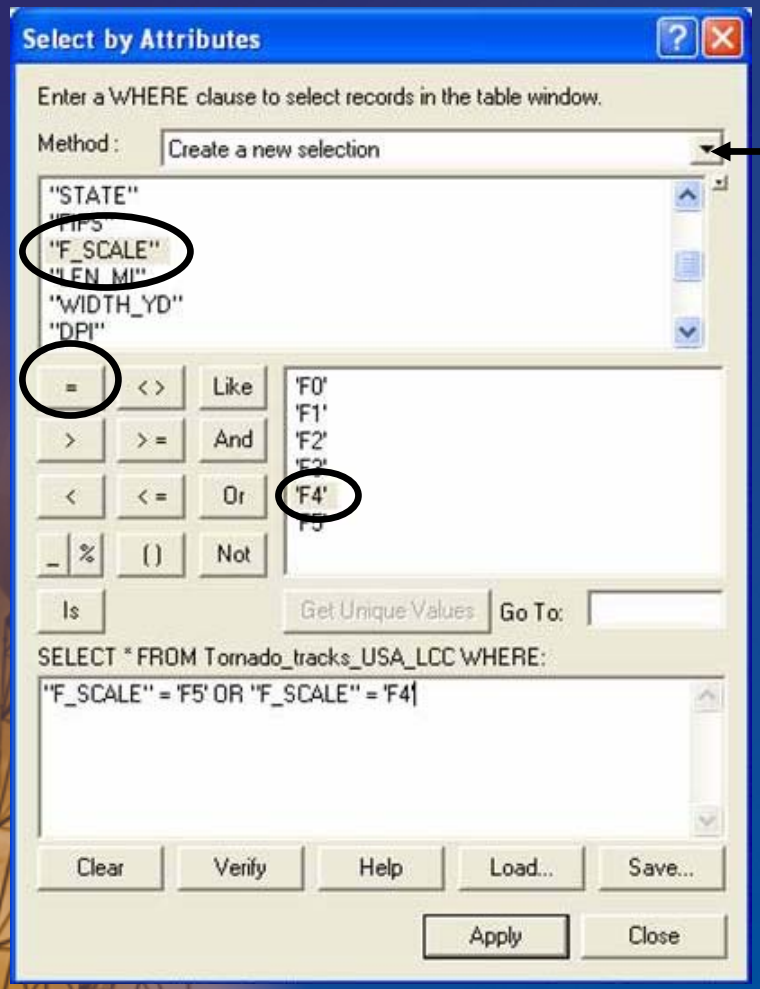
Example 1
Attribute Query (violent tornadoes)



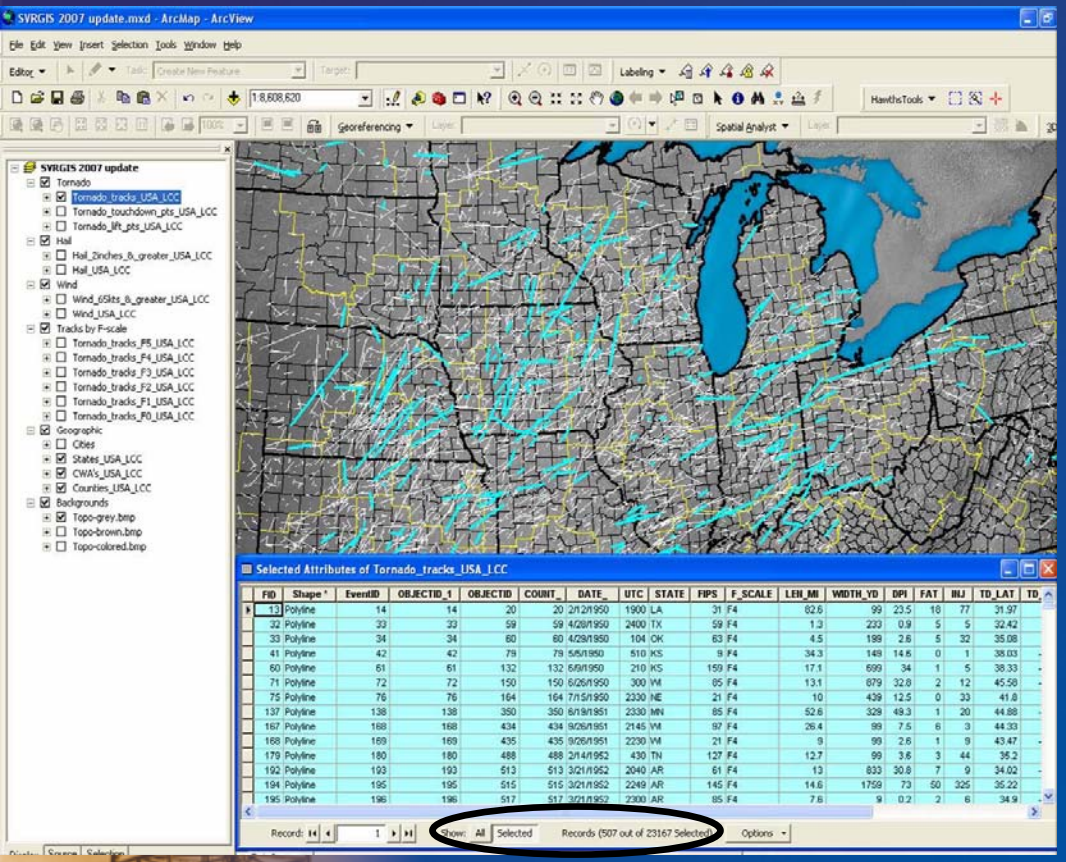
- Turn on the 'Tornado_tracks_USA_LCC' layer by clicking its box.
- Right-click and click 'Open Attribute Table' as shown.



- With the attribute table opened, you are able to see the field names or data properties in a tabular format.

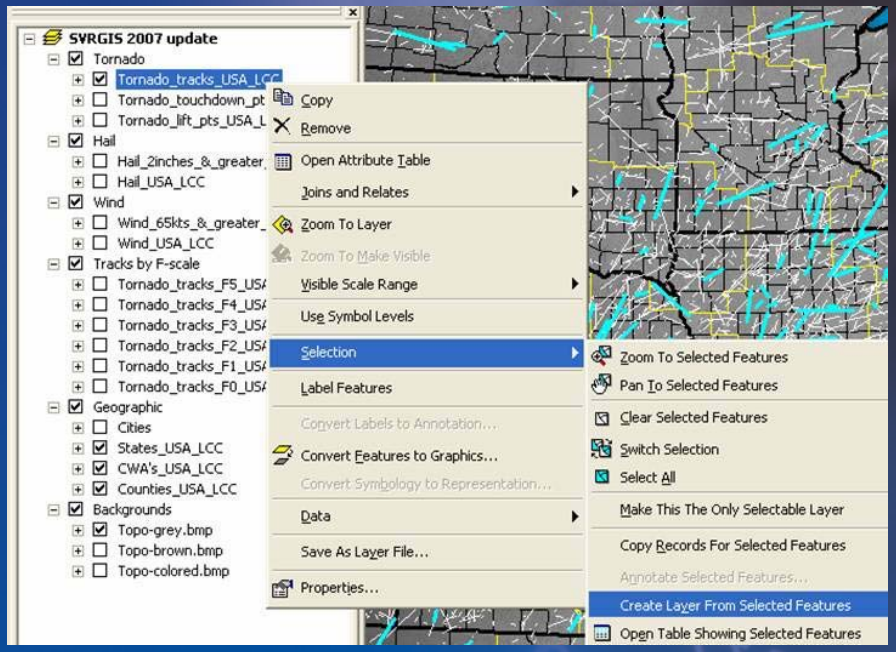


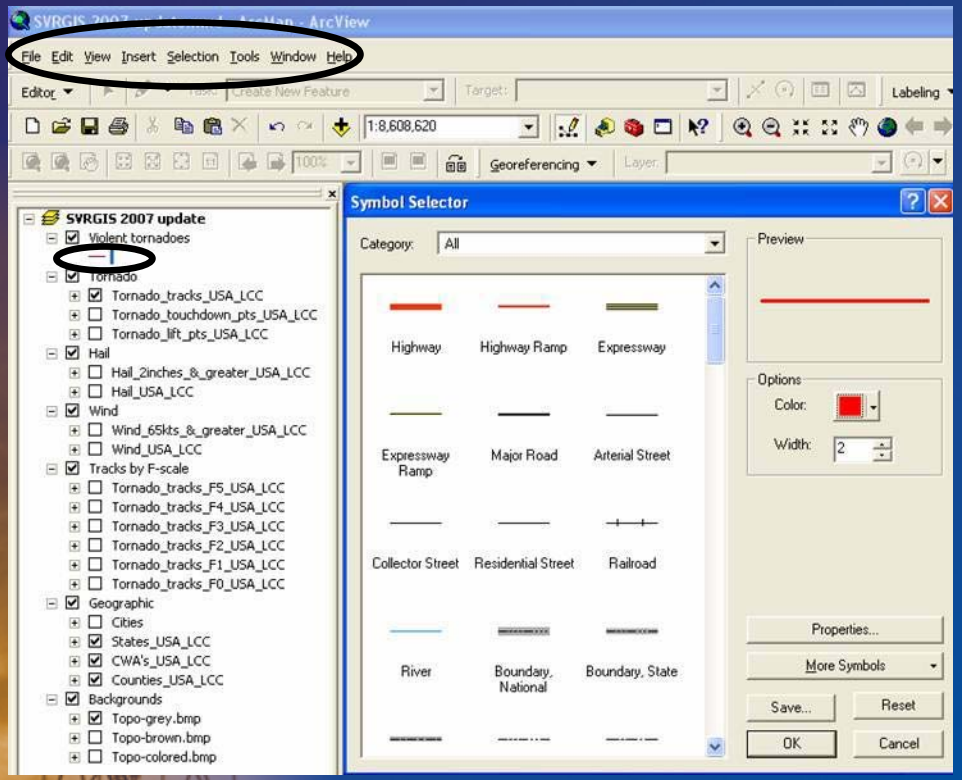
- Click 'Options' (see above) on the attribute table and click 'Select by Attributes'
- The 'Select by Attributes' window opens, 'Create a new selection' (default setting)
- The syntax you will be creating is based on Boolean logic: scroll down and double left click "F_SCALE"
- Click the '=' symbol
- Click 'Get Unique Values' button and a listing of choices will show (in this example: F0 through F5)
- Double click "F5"
- Then Click 'Or', '"F_SCALE"', '=', "F4"
- The Boolean logic statement should read "F_SCALE" = 'F5' OR "F_SCALE" = 'F4'
- Click 'Apply'



- The result are blue highlighted F4 and F5 tornado tracks in the ArcMap display
- Click the ‘Selected’ button on the ‘Attribute Table’ and you will see the tabular form of the selected features (507 out of 23,123 selected), click ‘All’ to see the selected and non-selected records again.
- Close the Attribute Table window

- Right-click on the ‘Tornado_tracks_USA_LCC’ layer, click ‘Selection’, then click ‘Create Layer from Selected Features’
- A new layer named ‘Tornado_tracks_USA_LCC selection’ is created. To see the newly created layer, please do the following steps.
- At the top of ArcMap in the Menubar (see below), click ‘Selection’, ‘Clear Selected Features’

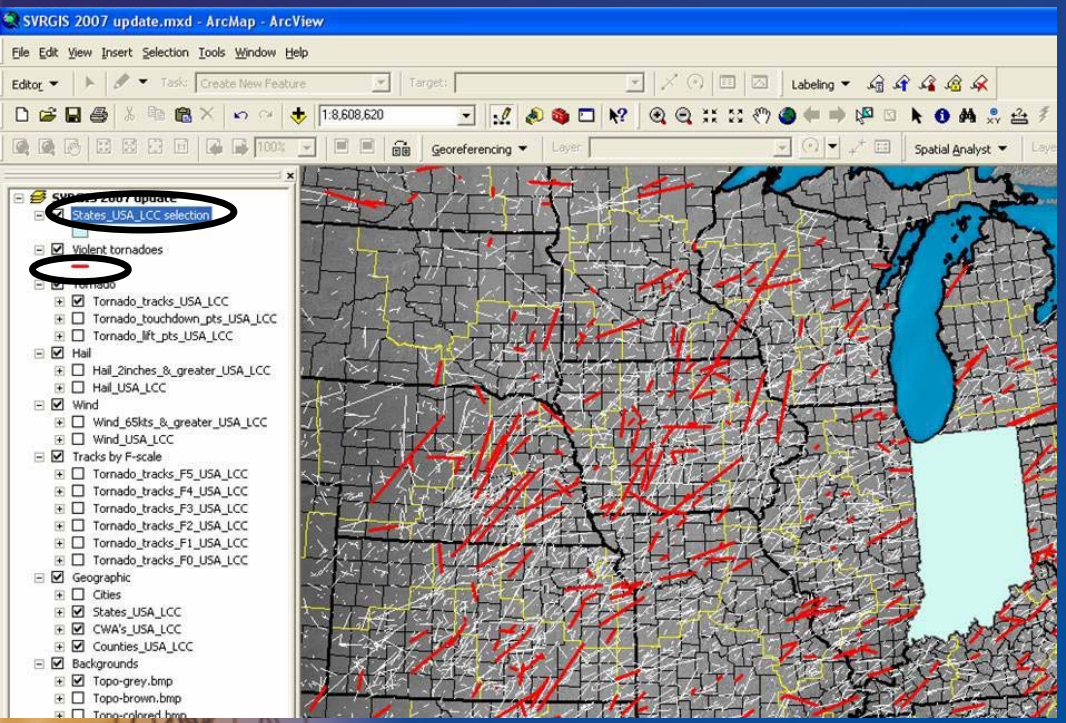




- **Left-click on the 'Tornado_tracks_USA_LCC selection' layer and then left-click again slowly**
- **Rename the layer and type 'Violent tornadoes' and then hit 'Enter' on the keyboard**
- **Left-click on the 'Violent tornadoes' symbol (small colored line) and a symbol selection menu opens**
- **Change the 'Color:' to Mars Red and the 'Width:' to 2, click OK**

Example 2
Attribute Query (Indiana)

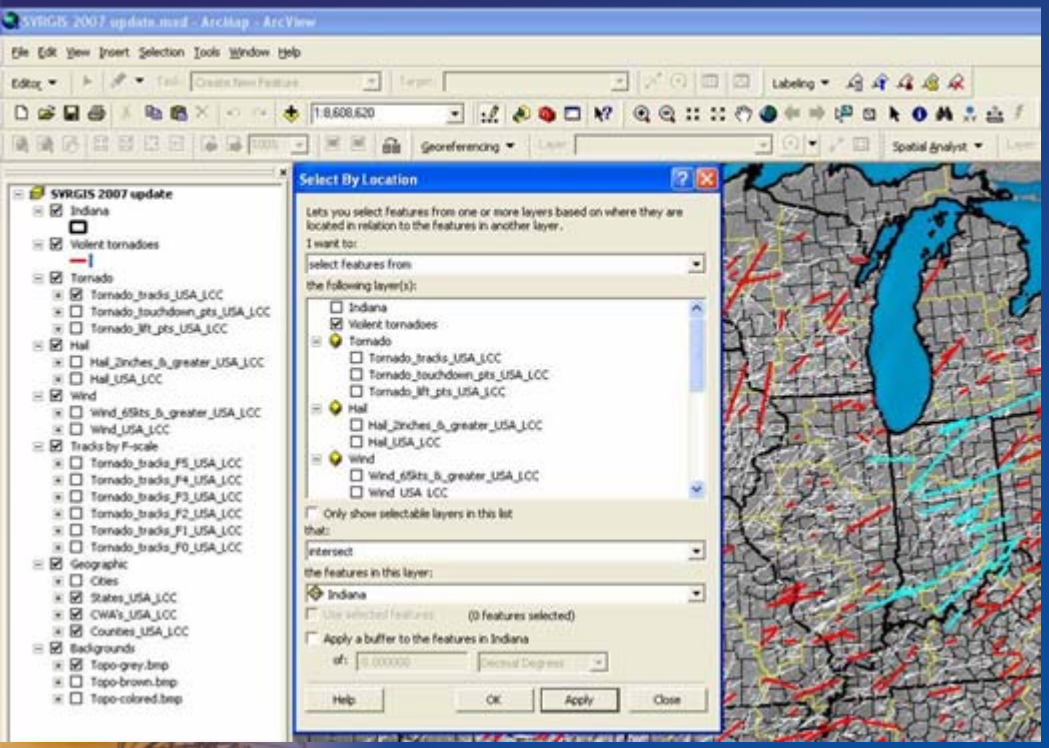
- Right-click the 'States_USA_LCC' layer and click 'Open Attribute Table'
- The 'States_USA_LCC' attribute table opens, scroll down and click the block tab for 'Indiana' to select Indiana (TIP: hold down 'control' for multiple states)
  - This is one of several ways to select features, another way is Boolean syntax shown previously
- Right-click the 'States_USA_LCC' layer and click 'Selection', 'Create Layer From Selected Features'



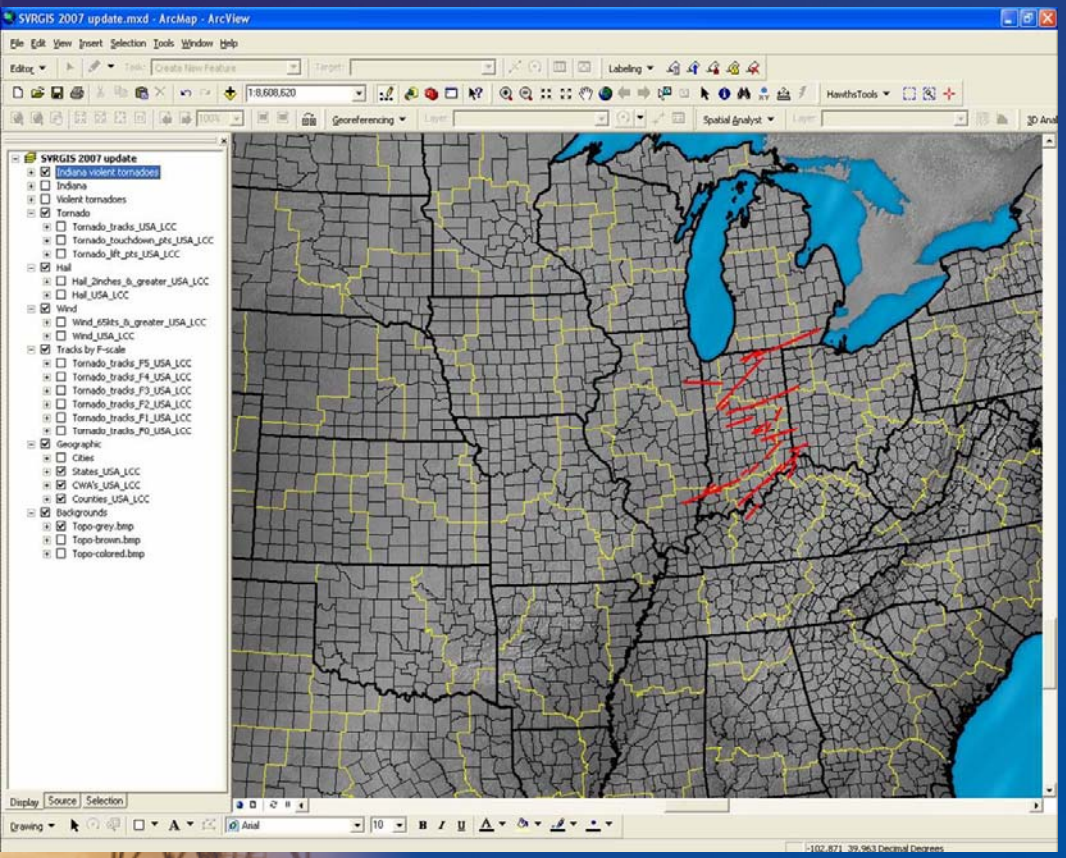
- Next, go to the ‘Menubar’ and click ‘Selection’, then click ‘Clear Selected Features’ and the map should look like this…with the new layer named ‘States_USA_LCC selection’ the top most layer
- Rename the ‘States_USA_LCC selection’ layer by clicking the name once, then once more and type ‘Indiana’, then hit ‘enter’ on the keyboard
- Change the ‘Indiana’ layer by double clicking the symbol beneath Indiana, the ‘Symbol Selector’ window will open, select ‘Hollow’ (1st column, 2nd row) and increase the width to ‘2’

Example 3

Spatial Query (Indiana violent tornadoes)



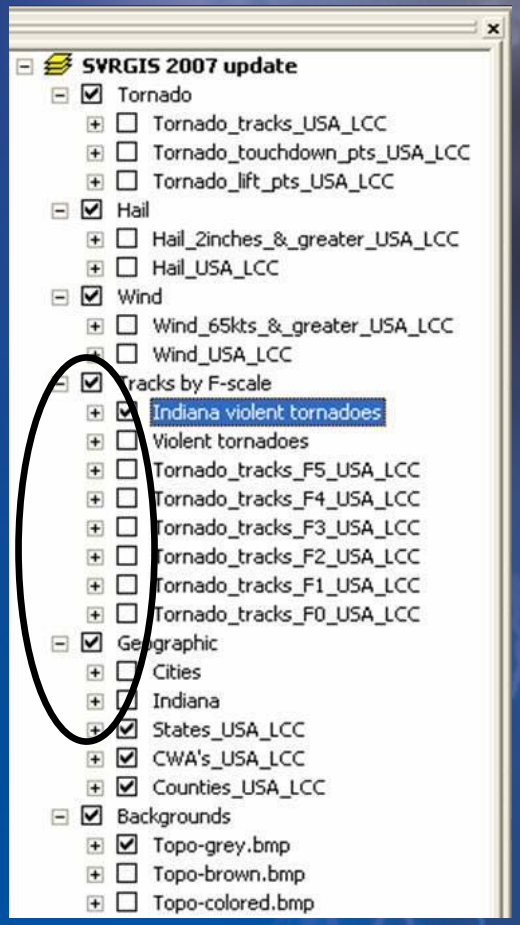
- At the 'Menubar', Click 'Selection', then click 'Select By Location…' and the 'Select by Location' window opens
- In the window, I want to: 'select features from' (pull-down default)
- Turn On (check) only 'Violent tornadoes' layer
- that: 'intersect' (select this from the pull-down)
- the features in this layer: 'Indiana' (select this from the pull-down)
- Click the 'Apply' button and close the 'Select by Location' window
- Right-click 'Violent tornadoes' layer, click 'Selection', then click 'Create Layer From Selected Features'



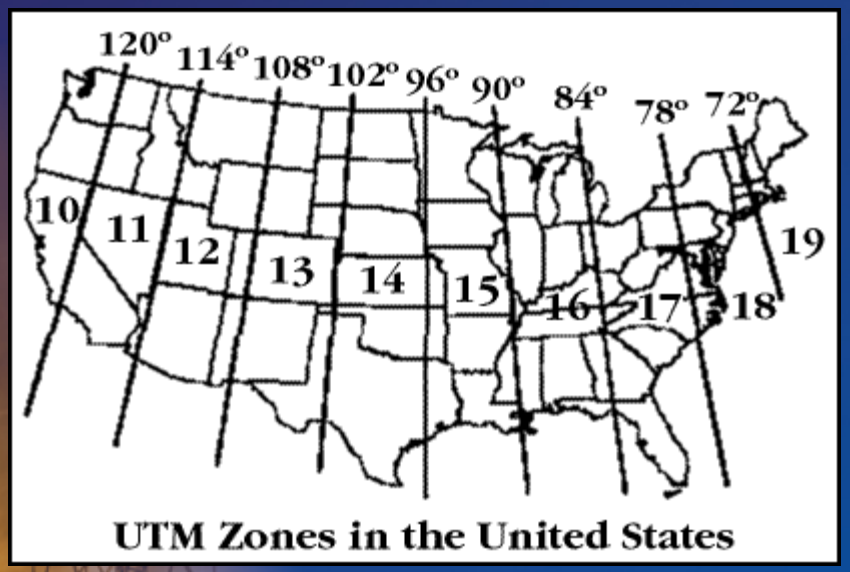
- Rename ‘Violent tornadoes selection’ layer by clicking on the layer’s name then type ‘Indiana violent tornadoes’
- Go to the ‘Menubar’ and click ‘Selection’, then click ‘Clear Selected Features’
- Click on the ‘Indiana violent tornadoes’ symbol and change the color to ‘Mars Red’ and width ‘2’, then click ‘OK’.
- Turn off the ‘Violent tornadoes’ layer and the ‘Tornado_tracks_USA_LCC’ layers by ‘unchecking’ the layer to hide them.
  - The violent tornadoes that have hit Indiana since 1950 will become apparent
- Click the ‘–’ and change it to a ‘+’ to hide the symbols to the ‘Indiana violent tornadoes’ layer, ‘Violent tornadoes’ layer, and ‘Indiana’ layer (see inset)

Arranging Layered Data

- In the Table of Contents (listing of layers), left-click and drag the 'Indiana violent tornadoes' layer under the 'Tracks by F-scale' layer
- Click the '–' and change it to a '+' to hide the 'Indiana violent tornadoes' symbol (see inset)
- Left-click and drag the 'Violent tornadoes' layer under the 'Indiana violent tornadoes' layer
- Click the '–' and change it to a '+' to hide the 'Violent tornadoes' symbol
- Left-click and drag the 'Indiana' layer under the 'Geographic' → 'Cities' layer

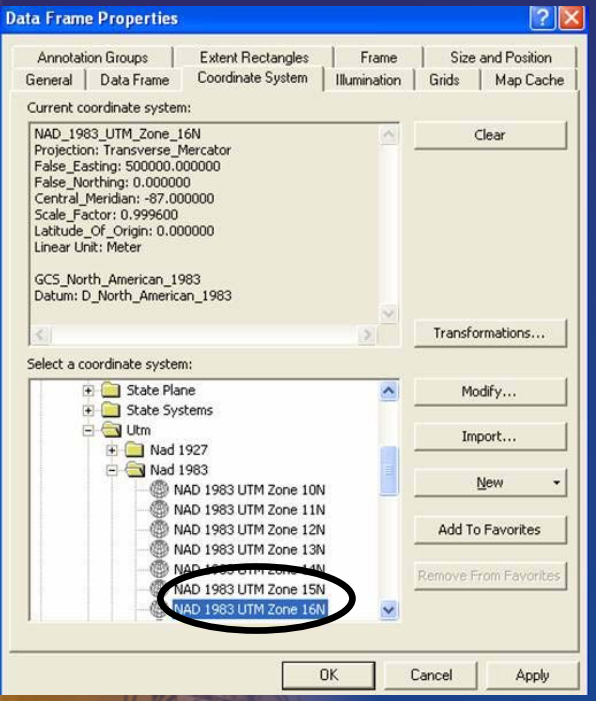


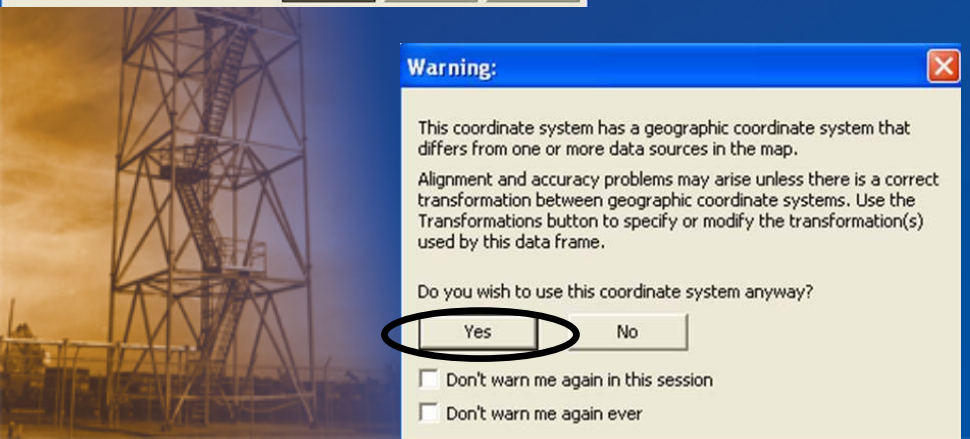
Regionalizing your projection (optional)



UTM Zones in the United States

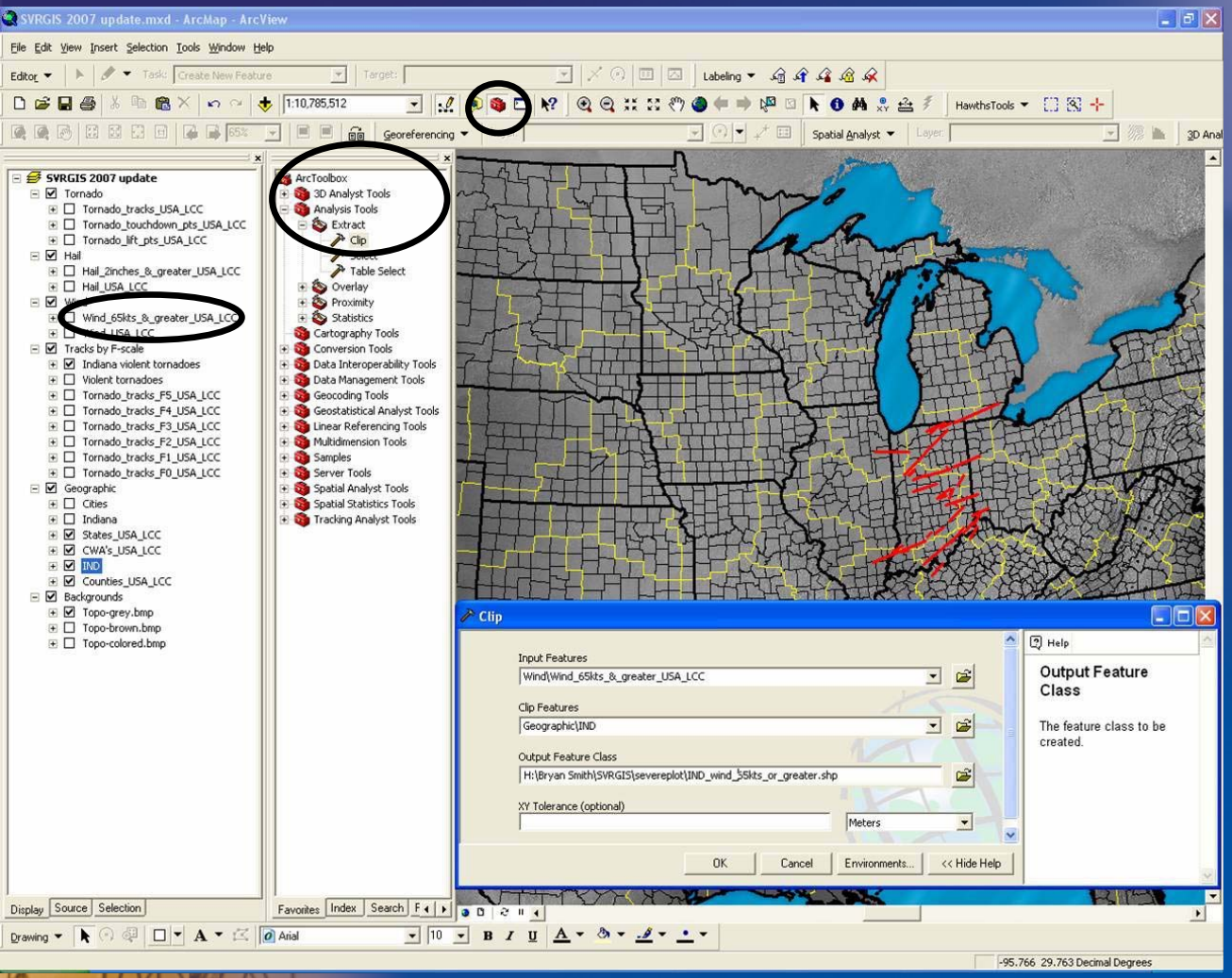
- Correctly projected data is necessary. The best national projection based on shape is the USA Contiguous Lambert Conformal Conic projection (default). If you want the database projected for a localized region (e.g., state or CWA), use Universal Transverse Mercator (UTM).
- The image shows the UTM Zones in the USA. Choose the zone that your area is mostly within (for Indiana, Zone 16N).
- These projection methods of displaying data are recommended if you are tailoring the database to a localized region.



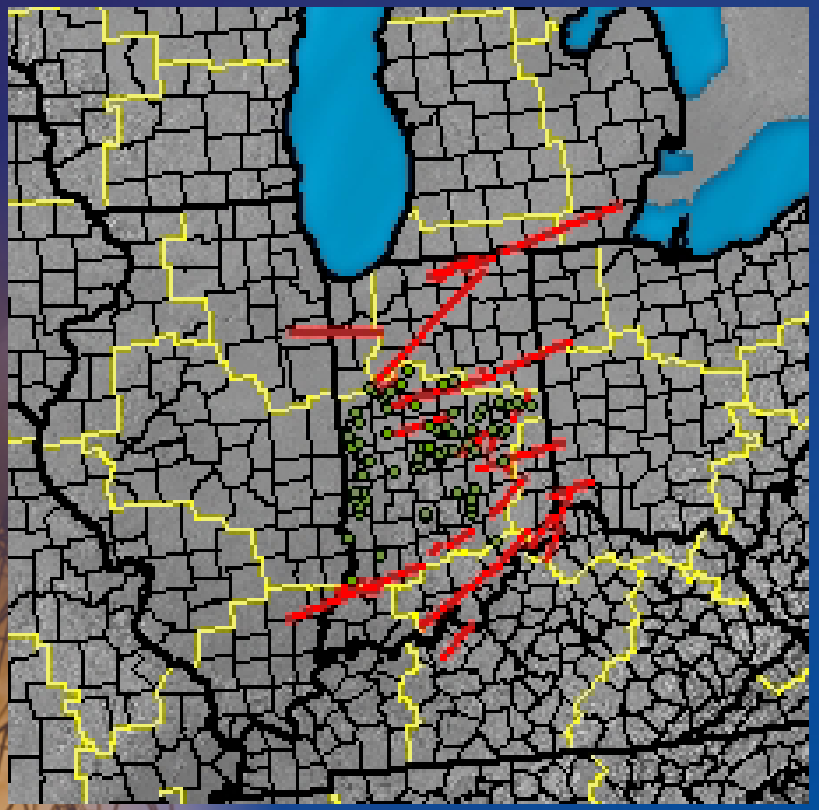


- **Right click on the 'SVRGIS 2007 update' button at the top of the Table of Contents and click the 'Properties' tab. When the Properties dialog box opens, under the Coordinate System tab click Predefined→Projected Coordinate Systems→Utm→NAD 1983→YourZone. Click "OK." If a warning pops up, click "Yes." You are now re-projected.**

Clip tool



- Clip tool – extracts input features that overlay the clip features
- Click the ArcToolbox icon
- Navigate to ArcToolbox→Analysis Tools→Extract→Clip (2 clicks)
- In the 'Clip' window…
  - ***Input Features***
    - ***Wind_65kts_&_greater_USA_LCC***
  - ***Clip Features***
    - ***IND***
  - ***Output Feature Class***
    - ***IND_wind_65kts_or_greater.shp***
      - ***Remember NO spaces in filename!***



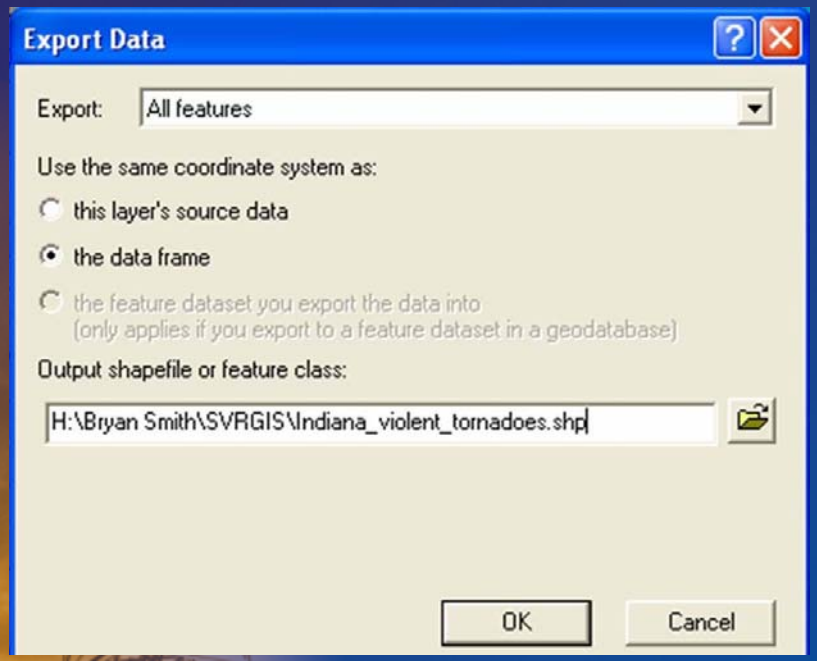
- A new ‘Clip’ window opens and displays the scripting process (not shown)
- The script finishes and the 65 kt or greater wind reports (green dots) are displayed
  - ‘Check’ the layer to see the data points
- Clipping is yet another way to build a ready-to-use database

Miscellaneous

- These tools are in the Tools Toolbar and you can make them visible or hide them by clicking the check found by going to the ‘Menubar’, ‘View’, ‘Toolbars’, ‘Tools’ (by default, these will already be displayed).
  - Zoom-in
  - Zoom-out
  - Pan
  - Select features
  - Select elements
  - Identify
  - Measure

Creating shapefiles (.shp)

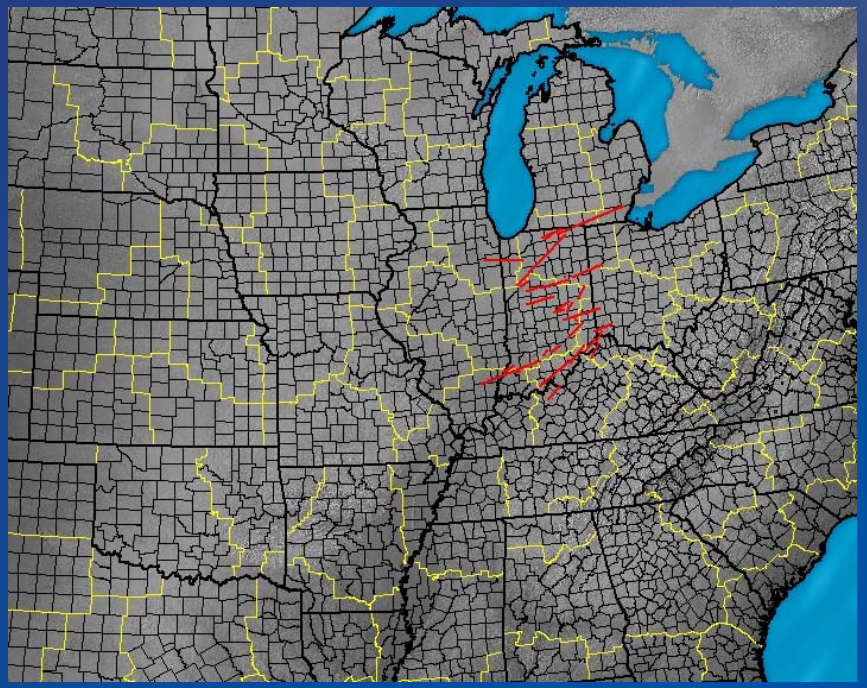
Indiana_violent_tornadoes.shp



- Right-click on a layer, 'Data', 'Export Data…'
- Export: 'All features' (drop-down list default)
- Use the same coordinate system as: The 'Export Data' window opens, if you would like to make the .shp according to the current projection, click 'the data frame'
- Specify the directory location and .shp name (do NOT leave spaces in the filename, spaces in the directory name are okay) and click 'OK'.
- In the window prompt, add the new .shp to the map if you desire.

Creating images

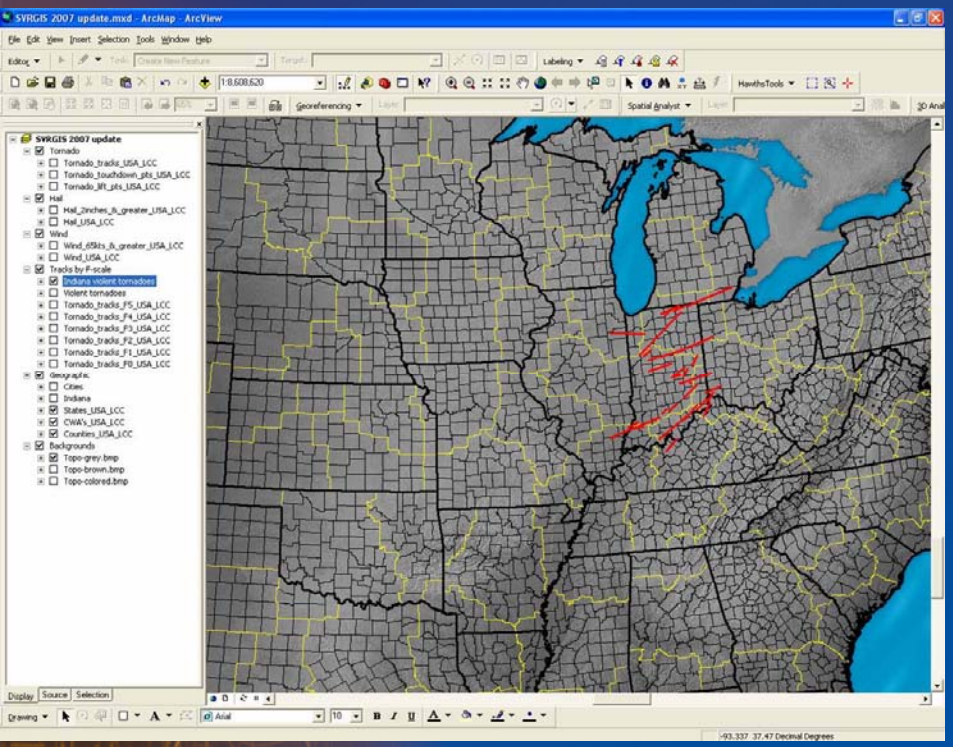
- At the ‘Menubar’, click ‘File’, then ‘Export Map’ and save with a name and file type (i.e. Indiana violent tornadoes map.jpg)



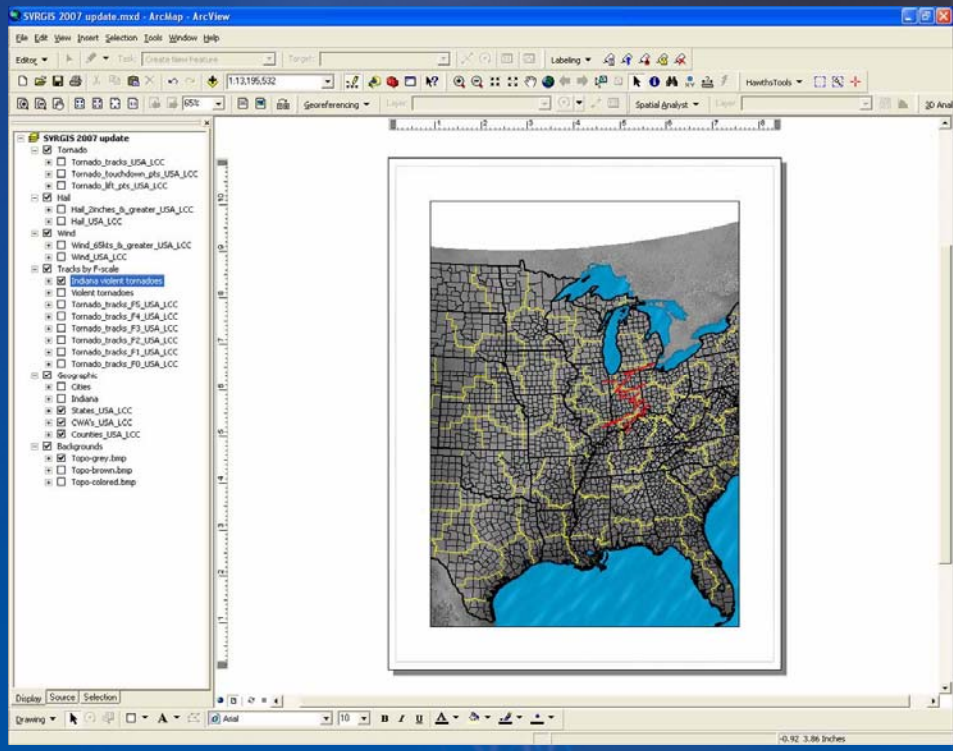
Creating maps

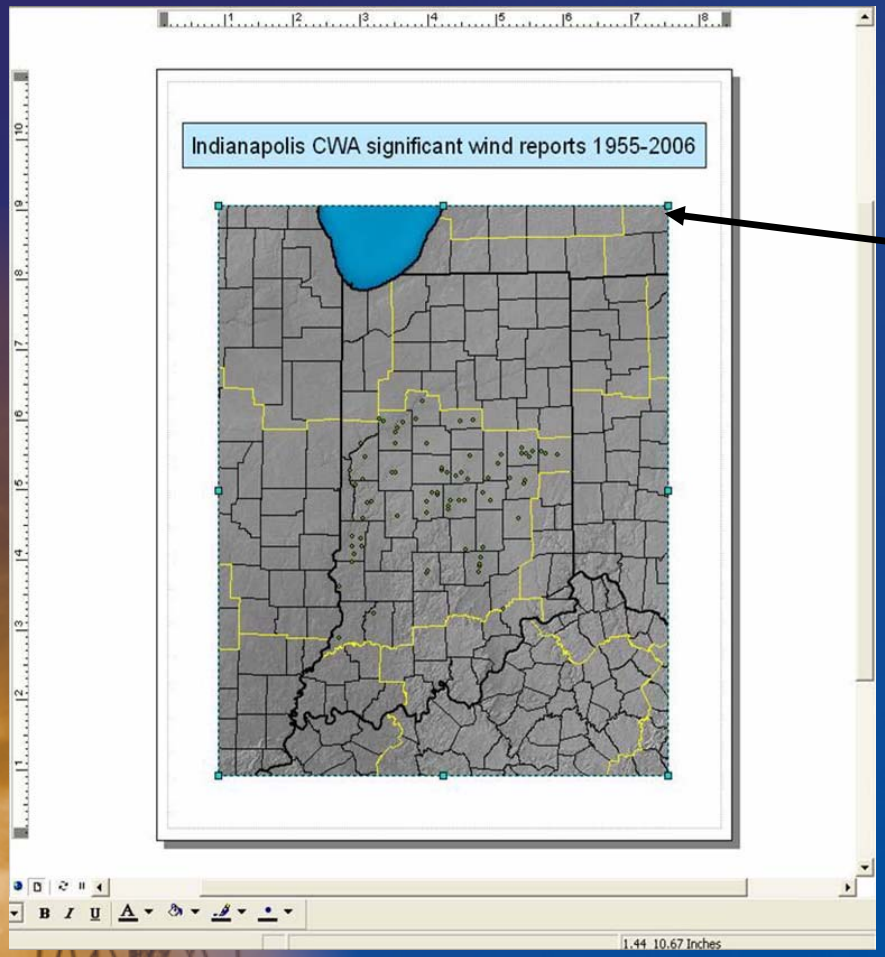
- Navigate in the Menubar to View→Layout View

Data View

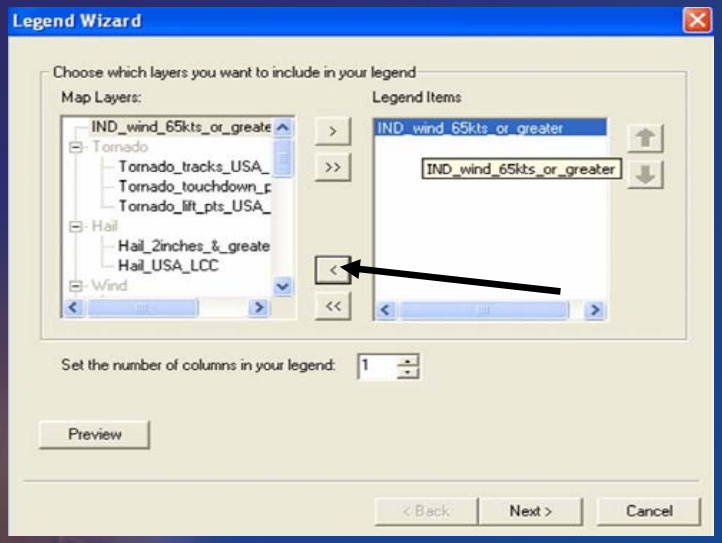


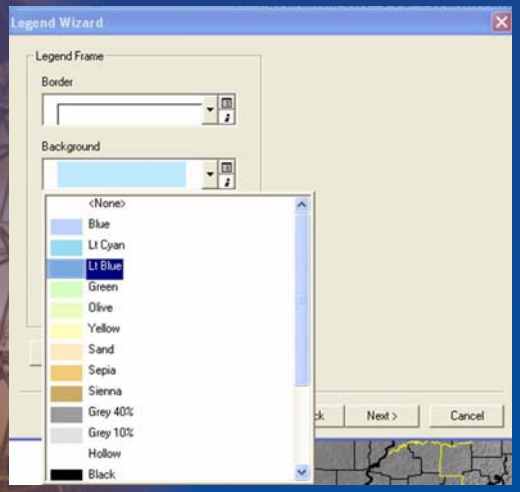
Layout View





- In Layout View, use the 'Zoom-in' tool to navigate to Indiana
- Use the 'Select elements' tool to re-size the SVRGIS 2007 update data frame window
- Insert→Title
  - Double click text box and name accordingly (e.g., Indianapolis CWA significant wind reports 1955-2006)
- With the Title selected, Insert→Neatline
  - A 'Neatline' window opens, change the background color as desired and click 'OK's





- Insert→North Arrow
  - Place onto map
- Insert→Legend
  - 'Legend' window opens, move layers out of 'Legend Items' by clicking the left button but leave IND_wind_65kts_or_greater
- Click 'Next' and remove "Legend" from 'Legend' box
- Click 'Next' and add a border and background, then click 'Next', 'Next', and 'Finish'

Finished map

- File→Export and name the file
  - The file should look similar to the basic map to the right